Aspergillosis

Aspergillosis is the name given to a wide variety of diseases caused by infection by fungi of the genus Aspergillus. The majority of cases occur in people with underlying illnesses such as tuberculosis[1] or chronic obstructive pulmonary disease (COPD), but with otherwise healthy immune systems.[2] Most commonly, aspergillosis occurs in the form of chronic pulmonary aspergillosis (CPA), aspergilloma or allergic bronchopulmonary aspergillosis (ABPA).[3] Some forms are intertwined; for example ABPA and simple aspergilloma can progress to CPA.

Other, non-invasive manifestations include fungal sinusitis (both allergic in nature and with established fungal balls), otomycosis (ear infection), keratitis (eye infection) and onychomycosis (nail infection). In most instances these are less severe, and curable with effective antifungal treatment.

People with deficient immune systems—such as patients undergoing hematopoietic stem cell transplantation, chemotherapy for leukaemia, or AIDS—are at risk of more disseminated disease. Acute invasive aspergillosis occurs when the immune system fails to prevent Aspergillus spores from entering the bloodstream via the lungs. Without the body mounting an effective immune response, fungal cells are free to disseminate throughout the body and can infect major organs such as the heart and kidneys.

The most frequently identified pathogen is *Aspergillus fumigatus*—a ubiquitous organism that is capable of living under extensive environmental stress. It is estimated that most humans inhale thousands of Aspergillus spores daily, but they do not impact on most people's health due to effective immune responses. Taken together, the major chronic, invasive and allergic forms of aspergillosis account for around 600,000 deaths annually worldwide.[1][Global 1][Global 2][Global 3][Global 4]

1 Symptoms

A fungus ball in the lungs may cause no symptoms and may be discovered only with a chest X-ray, or it may cause repeated coughing up of blood, chest pain, and occasionally severe, even fatal, bleeding. A rapidly invasive *Aspergillus* infection in the lungs often causes cough, fever, chest pain, and difficulty breathing.

Poorly controlled aspergillosis can disseminate through the blood stream to cause widespread organ damage.

Symptoms include fever, chills, shock, delirium, seizures and blood clots. The person may develop kidney failure, liver failure (causing jaundice), and breathing difficulties. Death can occur quickly.

Aspergillosis of the ear canal causes itching and occasionally pain. Fluid draining overnight from the ear may leave a stain on the pillow. Aspergillosis of the sinuses causes a feeling of congestion and sometimes pain or discharge. It can extend beyond the sinuses.[4]

In addition to the symptoms, an X-ray or computerised tomography (CT) scan of the infected area provides clues for making the diagnosis. Whenever possible, a doctor sends a sample of infected material to a laboratory to confirm identification of the fungus.

2 Diagnosis

On chest X-ray and CT, pulmonary aspergillosis classically manifests as a halo sign, and, later, an air crescent sign.[5] In hematologic patients with invasive aspergillosis, the galactomannan test can make the diagnosis in a noninvasive way. False positive Aspergillus Galactomannan test have been found in patients on intravenous treatment with some antibiotics or fluids containing gluconate or citric acid such as some transfusion platelets, parenteral nutrition or PlasmaLyte

On microscopy, *Aspergillus* species are reliably demonstrated by silver stains, e.g., Gridley stain or Gomori methenamine-silver.[6] These give the fungal walls a grayblack colour. The hyphae of Aspergillus species range in diameter from 2.5 to 4.5 µm. They have septate hyphae,[7] but these are not always apparent, and in such cases

they may be mistaken for Zygomycota.[6] *Aspergillus* hyphae tend to have dichotomous branching that is progressive and primarily at acute angles of about
45°.[6]

3 Treatment

The current medical treatments for aggressive invasive Aspergillosis include voriconazole and liposomal amphotericin B in combination with surgical debridement.[8] For the less aggressive allergic bronchopulmonary aspergillosis findings suggest the use of oral steroids for a prolonged period of time, preferably for 6–9 months in allergic aspergillosis of the lungs. Itraconazole is given with the

steroids, as it is considered to have a "steroid sparing" effect, causing the steroids to be more effective, allowing a lower dose.,[9]

Other drugs used, such as amphotericin B, caspofungin (in combination therapy only), flucytosine (in combination therapy only), or itraconazole,[10][11] are used to treat this fungal infection. However, a growing proportion of infections are resistant to the triazoles.[12] *A. fumigatus*, the most commonly infecting species, is intrinsically resistant to fluconazole.[13]

4 Prevention

Prevention of Aspergillosis involves a reduction of mold exposure via environmental infection-control. Antifungal prophylaxis can be given to high-risk patients. Posaconazole is often given as prophylaxis in severely immunocompromised patients.[14]

5 Infections in animals

Albeit relatively rare in humans, aspergillosis is a common and dangerous infection in birds, particularly in pet parrots. Mallards and other ducks are particularly susceptible, as they will often resort to poor food sources during bad weather. Captive raptors, such as falcons and hawks, are susceptible to this disease if they are kept in poor conditions and especially if they are fed pigeons, which are often carriers of "asper". It can be acute in chicks, but chronic in mature birds.

Aspergillosis has been the culprit in several rapid dieoffs among waterfowl. From 8 December until 14 December 2006, over 2,000 Mallards died in the Burley, Idaho area of the USA, an agricultural community approximately 150 miles southeast of Boise. Mouldy waste grain from the farmland and feedlots in the area is the suspected source. A similar aspergillosis outbreak caused by mouldy grain killed 500 Mallards in Iowa, USA, in 2005.

While there is no connection between aspergillosis and the H5N1 strain of avian influenza (commonly called "bird flu"), rapid die-offs caused by aspergillosis can spark fears of bird flu outbreaks. Laboratory analysis is the only way to distinguish bird flu from aspergillosis.

In dogs, aspergillosis is an uncommon disease typically affecting only the nasal passages (nasal aspergillosis). This is much more common in dolicocephalic breeds. It can also spread to the rest of the body; this is termed disseminated aspergillosis and is rare, usually affecting individuals with underlying immune disorders.

6 See also

- Primary cutaneous aspergillosis
- Otomycosis